

Do institutions matter in the very long-run?

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New evidence from OECD countries

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Abstract: Institutions are an important determinant of long-run economic growth. However, most studies only examine this relationship over a relatively short period and do not regularly include institutional variables in growth models. This article applies the pooled mean group (PMG) estimator to a panel of 18 OECD countries over 138 years. We find evidence that institutions matter for economic growth in the very long-run and conclude that economists should include them in any empirical application of the neoclassical growth model. Our result is robust to various robustness checks.

Keywords: Institutions, Growth, PMG estimator, OECD.

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1 Introduction

By the end of the last century, many economists, e.g. North (1990), emphasised the importance of institutions for economic growth. Buchanan (1975), for example, argued that institutions, such as property rights or binding rules for politicians, are important foundations for economic development since they prevent the government, amongst others, from arbitrary action. With such a constitutional framework, investment in physical and human capital will be higher and more efficient (Acemoglu, Johnson, & Robinson, 2001). In the past, researchers often treated institutions as constant in neoclassical growth models (e.g. Mankiw, Romer, & Weil, 1992). At the end of the 1990s, economists, e.g. Dawson (1998), extended this specification by including an institutional variable as a determinant of total factor productivity.

In the empirical literature, most studies only evaluate the effect of institutions on growth during the period between the Second World War and the beginning of the millennium. This period has been one of great progress in most western countries. Thus, the question arises if the results remain valid when examining longer periods.

In this study, we combine relatively new long-run datasets to estimate the effect of institutions on growth between 1870 and 2007. Our sample consists of 18 OECD countries. Since institutions mostly change slowly over time and thus most likely affect growth only over a more extended period, we estimate an error correction model that allows us to differentiate between short-run and long-run coefficients. This differentiation has two advantages. First, we can identify the long-run effect of institutions on economic growth. Second, it is plausible to assume that the OECD countries differ in the short-run due to single shocks affecting only one country. However, in the long-run, countries may behave similarly since they are all affected by a common technology, institutions and spillover effects. Thus, the PMG estimator may better fit real-world developments than previous estimation approaches.

2 Methodology and data

Following Bassanini and Scarpetta (2002), we estimate a restricted version of the neoclassical growth equation, including institutions. The following error correction model is a reparameterised autoregressive distributed lag (ARDL)(2,2,2,1) model:

$$\begin{aligned} \Delta y_{it} = & -\phi(y_{i,t-1} - \theta_{1i}d_{it} - \theta_{2i}h_{it} - \theta_{3i}s_{it}) + \lambda_i\Delta y_{i,t-1} + \delta_{1i}\Delta d_{it} + \delta_{2i}\Delta d_{i,t-1} \\ & + \delta_{3i}\Delta h_{it} + \delta_{4i}\Delta h_{i,t-1} + \delta_{5i}\Delta s_{it} + \delta_{6i}\Delta s_{i,t-1} + \mu_i + \epsilon_{it}, \end{aligned} \quad (1)$$

where y_{it} is GDP p.c., d_{it} is the level of institutions, h_{it} is the human capital stock and s_{it} are the capital flows in country i at time t . ϕ denotes the error correction parameter and can be interpreted as the speed of adjustment to equilibrium. Since we would like to estimate the effect of institutions on economic growth in the long-run, we need to combine several novel databases. Our dependent variable, GDP p.c. is taken from Bolt and Van Zanden (2020). The main variable of interest is the liberal democracy index from Coppedge et al. (2022) as a proxy for institutions. This variable takes a negative view on arbitrary policy action and emphasises the importance of the protection of individual rights by the constitutional framework of a country. As in previous studies, we use secondary educational attainment from Barro and Lee (2015) as a proxy for the human capital stock in a country. Finally, we include the investment-to-GDP ratio from Jordà, Schularick, and Taylor (2017). Since our dynamic heterogeneous panel has a relatively long time horizon and a medium number of cross-sections, we follow Pesaran, Shin, and Smith (1999) and make use of three possible estimators: First, we estimate our model using the dynamic fixed effects estimator (DFE). Since this is a pooled estimator, all countries are constrained to have the same slope parameter. Pesaran and Smith (1995) argue that the DFE estimator in such settings is inconsistent and biased. Thus, our second option is the mean group estimator (MG). Here, all countries are estimated separately, and the respective coefficients' average is taken afterwards. The third possibility is to combine both estimators to the PMG estimator. There, we assume differences across countries in the short-run and thus use the MG estimator, and similarities in the long-run and thus use the DFE estimator.

3 Results

Table 1 reports the baseline results for equation 1 for the PMG, MG and DFE estimator. We already know that the DFE estimator is inconsistent and biased. However, we still need to assess if the additional long-run homogeneity assumptions of the PMG estimator are efficient compared to the MG estimator. The Hausman test, in column 3, provides evidence in favour of the PMG estimator. Thus, in the following, we will focus on the PMG estimator only.

Since the convergence coefficient is significant and negative, we find evidence for convergence to the long-run equilibrium. This implies that short-run deviations from the long-run equilibrium path are corrected. When looking at the long-run coefficients, we find overall positive and significant results. The results of the standard growth model hold in the very long-run. Investment and human capital are important determinants of economic development. Our variable of interest, liberal democracy, exhibits a strong and positive effect on GDP p.c. growth. We find that institutions significantly push total factor productivity. In contrast, most of the short-run coefficients are insignificant. Only investment has a positive short-run effect, providing evidence for the Keynesian demand effect.

In such settings, the chosen lag structure may be a critical determinant of the coefficients. Thus, in table 2, columns 1-5 present different lag structures (incl. the main specification in column 3 as a reference). All estimates are PMG estimates. We also report the Akaike information criteria (AIC), which was used to determine the optimal lag length in the first place. The results are robust to different lags and only slightly change in magnitude. In addition, we assess robustness by controlling for time-specific effects in the long-run estimation. Thus, we have added 10-year dummies starting with the second period (1880-1889) in order to control for such effects. Column 6 shows the results when these dummies are included. Since these time fixed-effects absorb some of the effects, the magnitude of all coefficients decreases. Nevertheless, all variables remain significant and positive. Lastly, we add two world war dummies to control for the war-specific effects on the sample. The World War I dummy captures the period between 1914 and 1918,

and the World War II dummy captures the period between 1938 and 1945. Again, the results remain positive and significant. Interestingly, the effect of liberal democracy is the strongest in this specification. This points at the adverse effects of the war, which were not accounted for in the baseline estimation and thus extenuated the effect of liberal democracy. Eventually, we test the robustness of the baseline PMG results. Figure 1 shows the point estimates and 95%-confidence interval of the liberal democracy variable when different countries are excluded from the sample. "Main" denotes the point estimate from the baseline estimation. We find that the results are robust to the exclusion of different countries.

4 Conclusion

This article analysed the relationship between institutions and economic growth in an augmented neoclassical growth model in 18 OECD countries over 138 years. We find a significant and positive effect of the institutional variable on GDP p.c. growth. This effect is robust to different lag structures, the inclusion of dummy variables, war dummies and the exclusion of countries from the sample. As institutions critically impact total factor productivity and economic growth, they should be systematically included in standard growth models.

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Tables

Table 1: Baseline results

	(1) PMG	(2) MG	Hausman test	(3) DFE
Convergence coefficient				
<i>LogGDPp.c.t-1</i>	-0.0229*** (0.0071)	-0.0383*** (0.0092)		-0.0147*** (0.0038)
Long-run coefficients				
<i>LogLiberalDemocracy_t</i>	3.8335*** (0.5558)	8.5864** (4.0005)		2.6054*** (0.8107)
<i>LogSecondaryEducation_t</i>	0.6209*** (0.0992)	-0.4174 (1.3388)		0.8737*** (0.1771)
<i>LogInvestment_t</i>	2.8552*** (0.6742)	17.7537 (14.1944)		7.2078*** (2.0498)
			2.76	
Short-run coefficients				
Δ <i>LogGDPp.c.t-1</i>	0.1215*** (0.0311)	0.1008*** (0.0343)		0.1632*** (0.0205)
Δ <i>LogLiberalDemocracy_t</i>	-0.2267 (0.1410)	-0.2946 (0.1795)		0.0876** (0.0401)
Δ <i>Logliberaldemocracy_{t-1}</i>	-0.0377 (0.1313)	-0.1212 (0.1578)		0.0217 (0.0374)
Δ <i>LogSecondaryEducation_t</i>	0.0321 (0.1152)	-0.0057 (0.1149)		-0.0684 (0.1327)
Δ <i>LogSecondaryEducation_{t-1}</i>	-0.0211 (0.1710)	-0.0375 (0.1251)		0.1406 (0.1342)
Δ <i>LogInvestment_t</i>	0.4559*** (0.0691)	0.3964*** (0.0650)		0.4536*** (0.0523)
<i>Constant</i>	0.1687*** (0.0452)	0.2245*** (0.0813)		0.1059*** (0.0285)
Number of observations	2138	2138		2138
Number of countries	18	18		18
Number of periods	136	136		136

Notes: The Hausman test indicates that the PMG estimator is preferred over the MG estimator. *, ** and *** denote significance at the 10%-, 5%- and 1%-level.

Table 2: Extensions

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	ARDL	ARDL	ARDL	ARDL	ARDL	10 year	War
	(1,1,1,1)	(1,2,2,1)	(2,2,2,1)	(2,1,1,1)	(1,2,2,2)	Dummies	Dummies
Convergence coefficient							
$LogGDPp.c.t-1$	-0.0238*** (0.0070)	-0.0227*** (0.0069)	-0.0229*** (0.0071)	-0.0236*** (0.0072)	-0.0220*** (0.0066)	-0.0308*** (0.0086)	-0.0197*** (0.0060)
Long-run coefficients							
$LogLiberalDemocracy_t$	3.8199*** (0.5555)	3.8928*** (0.5786)	3.8335*** (0.5558)	3.8218*** (0.5604)	3.9709*** (0.6354)	1.1515*** (0.2841)	4.3865*** (0.6936)
$LogSecondaryEducation_t$	0.6124*** (0.0953)	0.6033*** (0.1021)	0.6209*** (0.0992)	0.6250*** (0.0954)	0.6195*** (0.1080)	1.1702*** (0.0899)	0.5310*** (0.1141)
$LogInvestment_t$	3.4616*** (0.6771)	3.4838*** (0.7054)	2.8552*** (0.6742)	2.7325*** (0.6593)	3.5654*** (0.7458)	2.4972*** (0.7035)	3.0029*** (0.7626)
Number of observations	2154	2139	2138	2140	2122	2138	2138
Number of countries	18	18	18	18	18	18	18
Number of periods	137	137	136	136	136	136	136
AIC	-8385.45	-8405.89	-8467.70	-8392.35	-8399.51	-	-

Notes: *, ** and *** denote significance at the 10%, 5% and 1%-level. The ARDL denotes the number of lags for the dependent variable and the independent variables in the order of the variables denoted in the output. In columns 6 and 7, 10-year and war dummies are included, respectively.

Figures

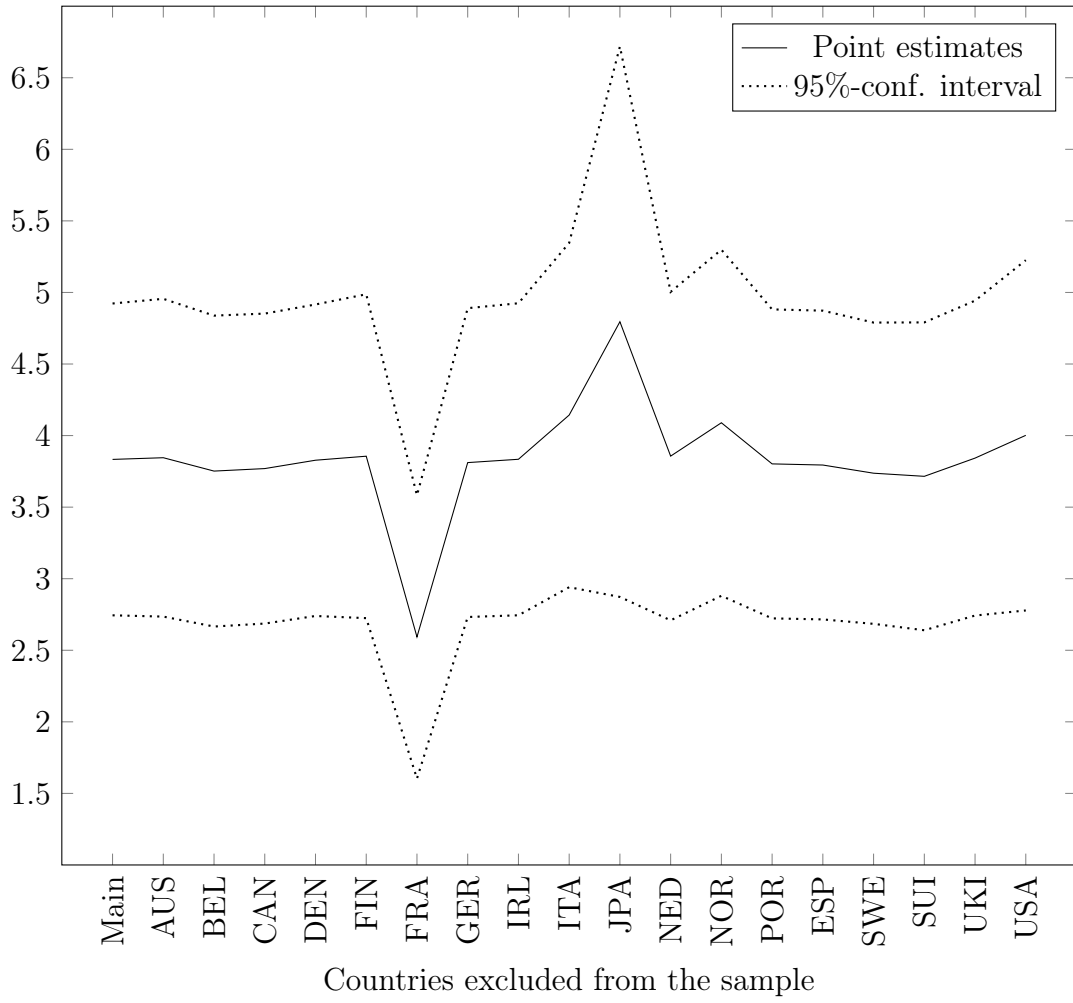


Figure 1: Sensitivity of liberal democracy